Mechanical and crash performance of unidirectional oil palm empty fruit bunch fibre-reinforced polypropylene composite

ABSTRACT

The mechanical properties of unidirectional oil palm empty fruit bunch (OPEFB) fibre / polypropylene (PP) composites were analysed. The composites were fabricated with unidirectional fibre orientations of 0°, 45°,and 90°,with mass fractions of 25%, 35%,and 45% for each fibre orientation angle. The composites were then subjected to tensile, flexural,and impact testing. Superior tensile, flexural,and impact strengths were observed for the unidirectional composites with 0° fibre orientation angle. A fibre loading of 35% provided the highest tensile strength,while fibre loadings of 25% and 45% yielded the greatest flexural and impact resistances, respectively.The crash performance of the unidirectional composite subjected to low-velocity impact in the automotive bumper fascia was investigated. The composite exhibited significantly improved energy absorption capability and comparable specific energy absorption when compared with the current material being used for the bumper fascia.

Keyword : Biocomposites; OPEFB Fibre; Crashworthiness; Directional orientation